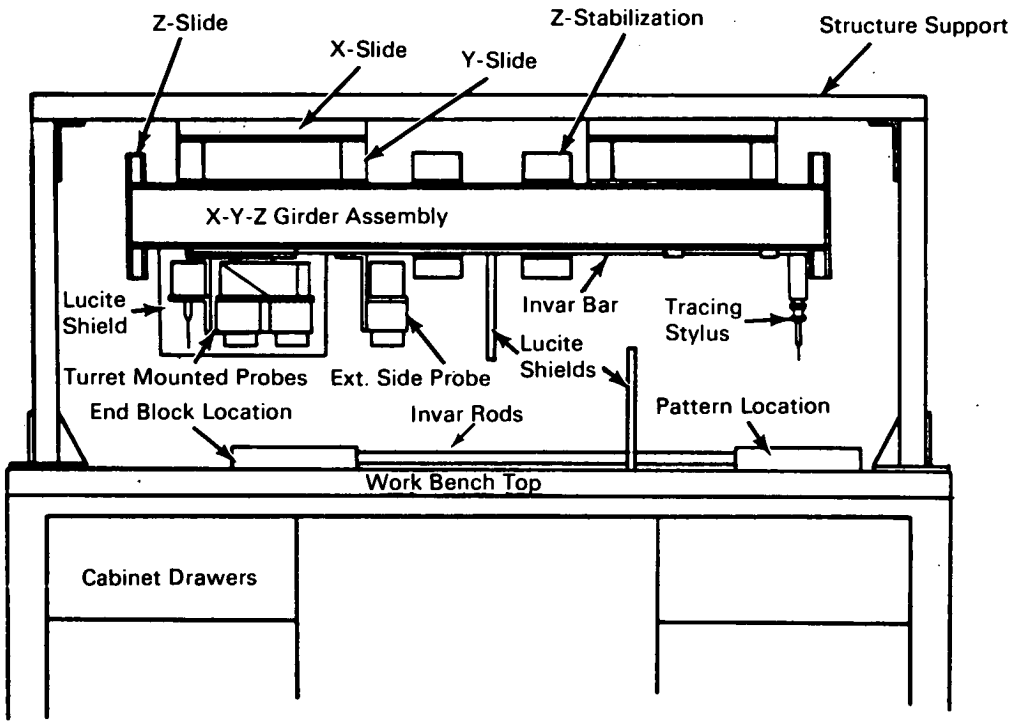
AEC-NASA TECH BRIEF

3-D Pantograph for Use in Hazardous Environments



3-D Pantograph for use in Hazardous Environments

The problem:

To develop a material measurement device for use with radioactive probes which could only be approached to a distance of about 3 feet. Commercial manipulators can be modified, but they are expensive and often do not possess sufficient positional stability relative to conditions such as temperature changes.

The solution:

Construction of a tracer-follower unit, capable of precisely controlled movement in the X-Y-Z planes, and maximizing off-the-shelf hardware.

How it's done:

The Pantograph consists of two horizontal beams fastened to "Y" slides which provide movement in and out of the plane of the figure. A third beam, inside these two beams, has up and down movement relative to the two enclosing beams by means of the "Z" slides on either end. The "Y" slides in turn are fastened to "X" slides which are underslung from a top structure support. Inexpensive ball bearing drawer-type slides, sufficiently accurate for the required positioning, are used. Base pads for holding

(continued overleaf)

both the part to be measured and the model or pattern are bound with Invar rods. The probe and stylus are also tied together to prevent thermal expansion.

With snug fitting free moving slides, the "X" and "Y" movements are very easy. The "Z" movement is counterbalanced with negator springs so that minimum effort is required for movement in the downward position while retaining enough retractive force to overcome gravity. Twisting movements affecting the accuracy of positioning are prevented by arranging two of the "Y" slides so that the sliding plane is located 90° relative to the other two slides. Two "Z" stabilization slides are added similarly. Another feature is the addition of magnetically operated brakes on the "X" and "Y" movements which limit motion in these directions once the "Z" motion reaches a predetermined down position. Damage is thus prevented in case of careless simultaneous three-plane movements by the operator.

Notes:

1. The item being inspected need not be visible to the operator because this system is based upon pattern following.
2. The 3-D Pantograph can be used in many industrial processes involving chemical corrosives, poisons, and bacteriological hazards, as well as in nuclear applications.
3. Inquiries may be directed to:
   Technology Utilization Officer
   AEC-NASA Space Nuclear Propulsion Office
   U.S. Atomic Energy Commission
   Washington, D.C. 20545
   Reference B70-10567

Patent status:

No patent action is contemplated by AEC or NASA.

Source: H. A. Wagner and C. D. Cowfer of
Westinghouse Electric Corp.
under contract to
Space Nuclear Propulsion Office
(NUC-10222)